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published in
The Journal of nutrition
2019

DOI (link to publisher)
10.1093/jn/nxy273

document version
Publisher's PDF, also known as Version of record

citation for published version (APA)
Mian, A., Jansen, P. W., Nguyen, A. N., Bowling, A., Renders, C. M., & Voortman, T. (2019). Children's Attention-Deficit/Hyperactivity Disorder Symptoms Predict Lower Diet Quality but Not Vice Versa: Results from Bidirectional Analyses in a Population-Based Cohort. *The Journal of nutrition*, *149*(4), 642-648. https://doi.org/10.1093/jn/nxy273

The Journal of Nutrition
Nutritional Epidemiology

Children's Attention-Deficit/Hyperactivity Disorder Symptoms Predict Lower Diet Quality but Not Vice Versa: Results from Bidirectional Analyses in a Population-Based Cohort

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ABSTRACT

Background: As an adjuvant for medication, dietary changes focused on specific nutrients have been proposed to prevent or reduce attention-deficit/hyperactivity disorder (ADHD) symptoms. However, whether an overall healthy dietary pattern is associated with ADHD symptom severity during childhood remains unclear. Furthermore, it is not clear what the direction of this association is.

Objectives: We aimed to examine the association between dietary patterns and ADHD symptoms in school-aged children. In addition, we aimed to identify the temporal direction of this association—that is, whether dietary patterns predict ADHD symptoms or vice versa.

Methods: We analyzed data from 3680 children participating in the Generation R Study, a prospective cohort in Rotterdam, Netherlands. ADHD symptoms were assessed with parent-report questionnaires at ages 6 and 10 y using the Child Behavior Checklist. Dietary intake was assessed at the age of 8 y with a validated food-frequency questionnaire. We computed a diet quality score reflecting adherence to dietary guidelines. We examined bidirectional associations of diet quality with ADHD symptom scores using multivariable linear regression analysis and cross-lagged modeling.

Results: Linear regressions showed that more ADHD symptoms at age 6 y were associated with a lower diet quality score at age 8 y (SD score = −0.08; 95% CI: −0.11, −0.05) but that diet quality at age 8 y was not associated with ADHD symptoms at age 10 y. Cross-lagged models confirmed a unidirectional relation from ADHD symptoms to diet quality but not vice versa. Associations did not differ by overweight status or between boys and girls.

Conclusion: Our study suggests that children with more ADHD symptoms may be at higher risk of an unhealthy diet but that overall diet quality does not affect ADHD risk. *J Nutr* 2019;149:642–648.

Keywords: attention-deficit/hyperactivity disorder, ADHD symptoms, dietary pattern, children, directionality, causality

Introduction

Over the last 20 y, prevalence rates of attention-deficit/hyperactivity disorder (ADHD) have increased (1). ADHD is often diagnosed during childhood; however, symptoms can still be present in adulthood. Proposed causes for this increase include elevated awareness, improved screening methods, and pharmaceutical marketing (2, 3). Changes in environmental factors and epigenetics have been linked to this increased prevalence as well (4).

Currently, treatment and care of ADHD symptoms consist of pharmacotherapy (5), sometimes in combination with psychotherapy (1, 6–8). However, medication does not reduce symptoms completely (9) and side effects such as sleeping problems and reduced taste perception and appetite result in low adherence rates among children. Therefore, alternative therapies focused on lifestyle changes are increasingly considered and examined (10–15). It has been suggested that altering dietary intake, particularly avoiding or supplementing specific

Manuscript received July 18, 2018. Initial review completed August 7, 2018. Revision accepted October 5, 2018.
First published online March 27, 2019; doi: https://doi.org/10.1093/jn/nxy273.

nutrients, such as reducing FAs and supplementing zinc, may reduce ADHD symptoms in children (16, 17).

However, it is also possible that ADHD symptoms drive unhealthy dietary behavior. For example, the impulsivity may cause binge eating and loss-of-control eating, and dysregulation of neurotransmitters can affect appetite and satiety (18, 19). Diets that have been proposed to reduce ADHD symptoms include sugar restriction, elimination of additive or preservative intake, and changes in FA intakes (16, 20). However, dietary intervention studies have produced mixed results (1, 16, 17). Trials that focused on PUFA supplementation (21) or elimination of artificial food colors (22) were not effective in reducing ADHD symptoms (1, 16, 23). On the contrary, trials with the so-called Few Foods Diet (a diet based on rice, lamb, lettuce, pears, and water) led to reductions in inattention and impulsiveness among children, with seemingly spillover effects to other behavior-related domains, such as improvements in communication styles (24, 25).

Most research in this field focused on specific nutrients (26, 27), whereas only a few studies investigated overall dietary patterns in relation to ADHD symptoms in children (28, 29). Information on dietary patterns is expected to be more revealing because nutrients interact with each other in their effects on health and children consume diets rather than single nutrients (30). Previously, a Western dietary pattern, characterized by high intakes of saturated and *trans* fat and low intakes of omega-3 FAs, fiber, fruits, and vegetables, was associated with more ADHD symptoms in children aged 14 y participating in an Australian cohort (n = 1799) (28). In keeping with those findings, a case-control study showed that higher adherence to dietary patterns high in fish, white meat, and other mineral-rich foods was associated with fewer ADHD symptoms in childhood (29). These studies were limited by the use of a cross-sectional design, precluding any conclusions on the temporal direction of the association.

Observational studies with repeated assessments of ADHD symptomatology and general dietary patterns are thus needed to unravel the temporality and direction of effects (30). Better insight into these effects is essential for developing targeted interventions aimed at lowering ADHD symptoms (31, 32). Therefore, the aim of the present study was to examine the association of dietary patterns and ADHD symptoms over time in a population-based sample of school-aged children and, more specifically, to determine the temporal direction of this association.

The Generation R Study is made possible by financial support from Erasmus Medical Center Rotterdam, Erasmus University Rotterdam (EUR), and the Netherlands Organization for Health Research and Development (ZonMw) "Geestkracht" program (no. 10.000.1003). TV received additional funding from Nestlé Nutrition (Nestec Ltd.) and the Thrasher Research Fund. PWJ was funded by the Dutch Diabetes Foundation (no. 2013.81.1664). The funders had no role in design or conduct of the study; collection, management, analysis, or interpretation of the data; or preparation, review, or approval of the manuscript. Author disclosures: AM, PWJ, ANN, AB, CMR, and TV, no conflicts of interest. Supplemental Tables 1–4 and Supplemental Figures 1 and 2 are available from the "Supplementary data" link in the online posting of the article and from the same link in the online table of contents at https://academic.oup.com/jn/.
The Generation R Study is conducted by the Erasmus Medical Center in close collaboration with the School of Law and the Faculty of Social Sciences at the Erasmus University, Rotterdam; the Municipal Health Service, Rotterdam area; and the Stichting Trombosedienst and Artsenlaboratorium Rijnmond (Star-MDC), Rotterdam.
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Abbreviations used: ADHD, attention-deficit/hyperactivity disorder; CBCL, Child Behavior Checklist; SCB, sugar-containing beverage; SDS, SD score.

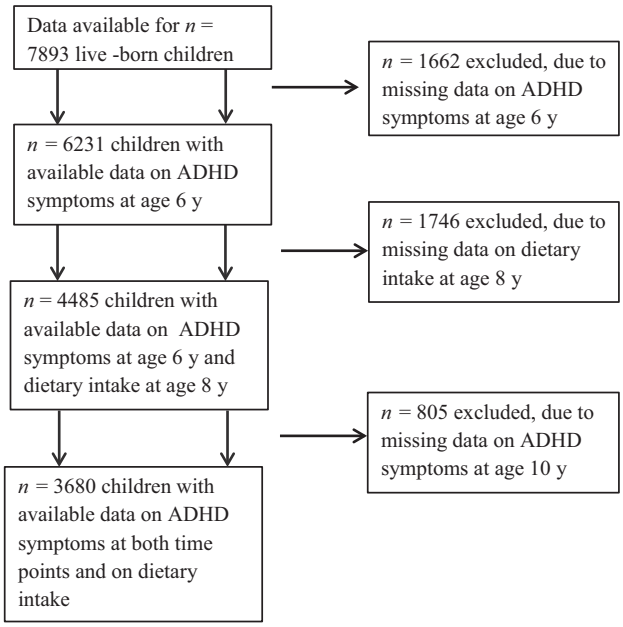

FIGURE 1 Flowchart of eligible children in the study population. ADHD, attention-deficit/hyperactivity disorder.

Methods

Study design

This study was embedded in the Generation R Study, a prospective cohort from fetal life onward in Rotterdam, Netherlands. Details on recruitment, enrollment, and the study design are described elsewhere (33). Written informed consent of all parents or caregivers was given at the enrollment in the Generation R Study. The design of the Generation R Study was approved by the Medical Ethical Committee of the Erasmus University Medical Center. Data on 7893 live-born children were available in the Generation R Study. For the current analyses, we included all children with a completed Child Behavior Checklist (CBCL) at ages 6 and 10 y and a semiquantitative FFQ at age 8 y, resulting in a sample of 3680 children for this study (**Figure 1**).

ADHD symptom assessment

ADHD symptoms were measured at the median ages of 6.0 (IQR: 5.7–6.3) and 9.7 (IQR: 9.5–10.0) y using the validated CBCL (CBCL/1.5–5 and CBCL/6–18, respectively). The CBCL is a standardized, reliable and validated child behavior questionnaire that can be filled out by parents or caregivers (34, 35). Both CBCL versions include a validated *Diagnostic and Statistical Manual of Mental Disorders*–oriented ADHD scale (36–39). The subscale of the CBCL/1.5–5 consisted of 6 ADHD-related problems, as follows: "can't concentrate," "can't sit still," "can't stand waiting," "demands must be met," "gets into everything," and "quickly shifts." Parents rated these items on a 3-point Likert scale (0 = not true, 1 = sometimes true, 2 = very true), resulting in a score ranging from 0 to 12. Cronbach's α for these items in the current study was 0.77. When children were aged 10 y, the CBCL/6–18 was used, which included 7 items: "fails to finish things," "can't concentrate and can't pay attention for long," "can't sit still," "impulsive or acts without thinking," "inattentive or easily distracted," "talks too much," and "unusually loud." Again, parents rated the items on a 3-point Likert scale (scale score range: 0–14). Cronbach's α for this scale was 0.81 in the current study. Pearson's correlation between the ADHD subscales at the different ages was 0.52 ($P < 0.001$).

Dietary intake assessment

We assessed the children's dietary intake at the median age of 8.1 y (IQR: 7.9–8.3 y) using a validated semiquantitative FFQ. The FFQ was filled in by the parents or caregivers, who were instructed to use the

last 4 wk as a reference period. Dietary patterns were quantified by means of a predefined diet quality score (40, 41), reflecting adherence to Dutch dietary recommendations for children (42). This diet quality score was previously developed on the basis of adherence to the Dutch dietary recommendations for children (42). This score included the following food groups: fruit (≥150 g/d), vegetables (≥150 g/d), whole grains (≥90 g/d), fish (≥60 g/wk), legumes (≥84 g/wk), nuts (≥15 g/d), dairy (≥300 g/d), oils and unsaturated fats (≥30 g/d), sugar-containing beverages (SCBs; ≤150 g/d), and high-fat and processed meat (≤250 g/wk) (42). The cutoff values were used to give a continuous score to each of the components ranging from 0 to 1. Scoring of the components was performed by calculating the ratio of reported and recommended intakes for each specific component in the diet quality score. For example, a score of 0 for the fruit component means that the child has not consumed any fruit, a score of 0.5 means that the child has consumed 75 of the 150 g recommended and a score of 1 means that the child has consumed ≥150 g of fruit/d. Reverse scoring was used for the components SCBs and high-fat and processed meat, meaning that higher scores reflected lower intakes. The overall diet quality score was the sum of the 10 component scores and ranged from 0 to 10, with higher scores representing a healthier overall diet. Further details on the included foods and scoring are described elsewhere (42).

Assessment of covariates

Information on maternal age, parity, ethnicity, and socioeconomic status was assessed in several surveys. During each trimester in pregnancy, we collected information on maternal smoking (categorized as never smoked during pregnancy, only smoked until pregnancy was known, or continued smoking during pregnancy) and on maternal alcohol consumption (categorized as never consumed alcohol during pregnancy, only consumed alcohol until pregnancy was known, or continued consumption during pregnancy). Maternal psychiatric symptoms were assessed with the validated Brief Symptom Inventory (43). Maternal height and weight were measured at enrollment, and BMI was calculated [weight divided by height squared (kg/m^2)]. Information on maternal education (higher education: yes or no), net household income (<€2800 or ≥€2800), and maternal age was collected at enrollment.

Information on child sex and ethnicity was assessed at birth. Child ethnicity was categorized into Dutch or non-Dutch on the basis of country of birth of the parents (44). Child height and weight were measured in our research center at ages 6 and 10 y, and BMI was calculated. BMI was standardized for age and sex, and overweight status was defined according to Cole's criteria (45). Child intelligence quotient (IQ) was estimated by assessing 2 subsets of the Dutch nonverbal intelligence test *Snijders-Oomen Niet-verbale intelligentie test-Revisie*(SON-R 2.5–7) at age 6 y (46). Time spent playing sports and screen time were measured with questionnaires that were filled out at the age of ∼8 y and categorized into <1, ≥1 to <2, ≥2 to <4, and ≥4 h/wk. Furthermore, whether the child used ADHD medication was assessed at the research center when children were ages 6 and 10 y old.

Statistical analyses

Both ADHD symptoms and diet quality scores were analyzed as continuous variables, expressed as SD scores (SDS). The diet quality score was adjusted for total energy intake and also expressed in SDS. Linear regression models were used to examine the relation of *1*) ADHD at age 6 y with diet quality at age 8 y and *2*) diet quality at age 8 y with ADHD symptoms at age 10 y. Subsequently, cross-lagged modeling was used to examine bidirectional associations between childhood ADHD symptoms and dietary patterns. This cross-lagged model is a path analysis and includes linear regression analyses estimating associations between dietary patterns and ADHD in both directions as well as the correlation between the 2 repeated ADHD assessments.

All analyses were adjusted for potential confounders using 3 models: in model 1 we adjusted for energy intake; in model 2, the analyses were additionally adjusted for child IQ, ethnicity, sex, BMI, ADHD medication use, household income, and maternal age, education, smoking, alcohol consumption, and BMI; model 3 consisted of additional adjustments for screen time and physical activity to examine whether associations were independent of other child lifestyle factors. Effect modification by child overweight status and sex was examined using interaction terms in model 3, and if the interaction term was significant ($P < 0.05$), the analysis would be stratified.

As a sensitivity analysis, for both the linear regression and cross-lagged models we repeated our analyses restricted to participants with a Dutch ethnic background ($n = 2591$) to reduce the risk of residual confounding by ethnicity. We also repeated the analyses after excluding children who used medication for their ADHD symptoms to rule out any potential effect of medication use ($n = 3305$).

To reduce bias by missing data, multiple imputations ($n = 10$ imputations) were used for covariates by means of predictive mean matching. The presented results are the pooled effects estimates of the 10 imputations. Analyses were performed using SPSS version 21.0 (IBM Corporation) and Mplus version 6.1 (Muthén & Muthén).

Results

Study population characteristics

Table 1 presents the characteristics of the 3680 children in our study population. The majority of the children were of Dutch origin (70.4%), and 14.5% were overweight or obese. Of the mothers, 33.8% were overweight or obese. Almost half of the children had an average screen time of ≥2 h/d (49.7%) and participated in sports between 2 and 4 h/wk (45.8%). At age 6 y, 0.6% of the study population used medication for ADHD, which increased to 3.3% at age 10 y. The baseline characteristics did not materially differ before and after multiple imputation (**Supplemental Table 1**).

ADHD symptoms and diet in childhood

In the first set of multivariable linear regression analyses, we examined whether ADHD symptoms at age 6 y were associated with dietary patterns 2 y later. In the basic model (model 1), we observed an inverse association between ADHD symptoms at age 6 y and diet quality at age 8 y (SDS = −0.11; 95% CI: −0.14, −0.08) (Table 2). This association remained significant when adjusted for social (model 2; SDS = −0.09; 95% CI: −0.12, −0.05) and lifestyle (model 3; SDS = −0.08; 95% CI: −0.11, −0.05) factors. Thus, a 1-point higher ADHD symptom SDS was associated with a reduction in SDS of 0.08 in diet quality. In the second set of linear regressions, a higher diet quality score at age 8 y was associated with a lower ADHD symptom score at age 10 y in the basic model (model 1; SDS = −0.06; 95% CI: −0.09, −0.02) (Table 2). However, this association was explained by confounders (model 2: SDS = −0.03; 95% CI: −0.06, 0.004; model 3: SDS = −0.02; 95% CI: −0.05, 0.01). This means that a 1-point higher diet quality SDS was associated with a 0.02 lower ADHD symptom SDS.

Directionality of associations between ADHD symptoms and diet

Results of the cross-lagged models, adjusted for confounding variables (model 3), are shown in Figure 2. In line with the results obtained from the linear regression analyses, we found a significant inverse association between ADHD symptoms at age 6 y and dietary patterns at age 8 y (SDS = −0.09; 95% CI: −0.15, −0.03) and no association between dietary patterns at age 8 y and ADHD symptoms at age 10 y (SDS = 0.02; 95% CI: −0.02, 0.06).

TABLE 1 Characteristics of the study population[1]

	Value
Child characteristics	
Sex, % female	50.4
Birth weight, g	3470 (2770– 4170)
Gestational age at birth, wk	40.1 (38.1–42.1)
Ethnicity, % Dutch	70.4
Child weight status,[2] %	
Overweight or obese at age 6 y	14.5
Overweight or obese at age 10 y	14.6
IQ at age 6 y	103 (87–119)
Child lifestyle characteristics	
Age at FFQ, y	8.1 (7.9–8.3)
Diet quality score at age 8 y	4.8 ± 1.2
Energy intake at age 8 y, kcal/d	1460 (1014–1906)
First ADHD symptom sum score	
Age at first assessment, y	6.0 (5.7–6.3)
ADHD symptom score at age 6 y	2.0 (0.0–5.0)
Medication use at age 6 y, %	0.6
Second ADHD symptom sum score	
Age at second assessment, y	9.7 (9.5–10.0)
ADHD symptom score at age 10 y	2.0 (0.0–6.0)
Medication use at age 10 y, %	3.3
Child's physical activity at age 10 y, %	
<1 h/wk	5.5
≥1 to <2 h/wk	26.9
≥2 to <4 h/wk	44.5
≥4 h/wk	23.1
Child's screen time at age 8 y, %	
≥2 h/d	49.7
Parental characteristics at enrollment	
Parity, %	
First-born child	59.4
Age of mother, y	32.0 (26.6–37.5)
Maternal weight status (BMI, in kg/m^2), %	
Normal weight (≤18.5 to <25)	62.2
Overweight (≥25 to <30)	24.7
Obese (≥30)	13.2
Maternal Brief Symptom Inventory score	0.13 (0.0–0.36)
Maternal alcohol consumption, %	
Never consumed alcohol in pregnancy	32.0
Maternal smoking, %	
Never smoked during pregnancy	77.8
Marital status, %	
Married or living together	92.9
Maternal educational level, %	
Higher education	59.6
Net household income, %	
≥€2800/mo	69.9

[1] Values are means ± SDs when continuous variables were normally distributed, medians (IQRs) for continuous variables with a skewed distribution, and percentages for categorical variables; $n = 3680$. ADHD, attention-deficit/hyperactivity disorder; IQ, intelligence quotient.
[2] BMI was standardized for age and sex, and overweight or obese status was defined according to Cole's criteria.

Additional analyses

Results were similar before and after multiple imputation (Supplemental Table 1 and **Supplemental Table 2**). Associations of diet quality with ADHD symptoms were not significantly different for boys and girls (set 1—ADHD-to-diet: *P*-interaction = 0.46; set 2—diet-to-ADHD: *P*-interaction = 0.68) or between children who were overweight or obese compared with those who were not (set 1: *P*-interaction = 0.06; set 2: *P*-interaction = 0.11). Furthermore, because we observed significant associations in our ADHD-to-diet model, we checked whether these associations were influenced by specific dietary components. After excluding specific food groups one at a time, similar associations were observed for ADHD with diet quality. Associations in the subsample of children of Dutch ethnic background were similar to those observed for the whole group (**Supplemental Table 3**, **Supplemental Figure 1**). In addition, excluding medication users resulted in associations similar to those observed for the whole group, for both the linear regressions and cross-lagged models (**Supplemental Table 4**, **Supplemental Figure 2**).

Discussion

To our knowledge, this is the first observational study assessing bidirectional associations between ADHD symptoms and dietary patterns in childhood. Our results suggest that greater ADHD symptoms are associated with a subsequent poorer diet quality, but that diet quality is not an independent predictor of later ADHD symptoms.

Our finding that ADHD symptoms are prospectively associated with a poorer diet quality is in line with previous cross-sectional studies (12, 27, 47, 48). For instance, Holton and Nigg (12) found that children with ADHD ($n = 184$) had a 2-times higher chance to have unhealthy dietary behaviors, specifically a higher intake of SCBs and a lower intake of water, than children without ADHD ($n = 104$). In our study, we observed that associations with poorer overall diet quality were not driven by the intake of one specific food group, suggesting that the overall dietary pattern may be affected. Other cross-sectional studies also suggested that children with ADHD symptoms tend to have a low-quality dietary pattern (27, 47, 48). Our findings are an important addition to these previous cross-sectional studies by showing that the association is prospective, with ADHD symptoms being associated with later dietary quality but not vice versa.

A possible explanation for the association of ADHD symptoms with subsequent diet is that having an unhealthy or less-balanced diet is a direct result of core ADHD symptoms such as restlessness and poor internal organization. This may translate into impulsive eating of highly palatable foods or having no patience to eat vegetables, which are less rewarding than high-caloric foods (27, 28, 49). Indirect effects of ADHD symptoms on diet quality may be that parents try to soothe difficult behavior of their children by offering the meals, snacks, and beverages children prefer instead of more healthy choices. Importantly, future research is needed to replicate our study and to unravel any potential pathways. In addition, it is necessary to unravel both parental and child barriers in feeding styles by means of qualitative studies.

Our analyses showed no association between diet quality and later ADHD symptoms. This indicates that general dietary patterns in childhood may not affect the development of later ADHD symptoms. It may also be possible that we could not detect a possible association due to the timing of our follow-up measurements and the young age of the children. Both ADHD symptoms and feeding styles may change between the ages of 6 and 10 y (31, 50), with parents becoming less in control of their child's diet (51). Alternatively, ADHD symptoms have also been suggested to be affected acutely by intake of certain foods or

TABLE 2 Associations between diet quality and ADHD symptoms in children[1]

	β (95% CI) for outcome SD score	P
Analysis set 1: ADHD at age 6 y → diet at age 8 y		
Model 1: basic	−0.11 (−0.14, −0.08)	<0.001
Model 2: sociodemographic	−0.09 (−0.12, −0.05)	<0.001
Model 3: child lifestyle	−0.08 (−0.11, −0.05)	<0.001
Analysis set 2: diet at age 8 y → ADHD at age 10 y		
Model 1: basic	−0.06 (−0.09, −0.02)	0.001
Model 2: sociodemographic	−0.03 (−0.06, 0.004)	0.09
Model 3: child lifestyle	−0.02 (−0.05, 0.01)	0.16

[1]Values are pooled standardized regression coefficients; $n = 3680$. Model 1 adjusted for total energy intake at age 8 y and for sex; model 2 additionally adjusted for child ethnicity, sex, age, maternal BMI, child IQ score, BMI at ages 6 or 10 y (standardized), ADHD medication, maternal education, maternal smoking, maternal alcohol use, maternal psychiatric symptoms, and net household income; model 3 additionally adjusted for screen time and sport hours. ADHD, attention-deficit/hyperactivity disorder; IQ, intelligence quotient; SDS, standard deviation score.

food components, rather than by long-term dietary intake (52), a possibility that could not be examined with these data.

We hypothesized that associations between ADHD symptoms and dietary patterns may differ between boys and girls, because both diet as well as the severity and type of ADHD symptoms have been shown to differ by sex (47, 53). However, we did not observe any differences in associations between boys and girls in this study. In addition, we examined whether the association between ADHD symptoms and dietary patterns differed for children with overweight or obesity compared with those with normal weight, because both diet and ADHD have been linked to obesity (18, 54), but our results did not indicate any differences by weight status. Future research should further explore potential differences in associations by sex and the interrelations between diet, ADHD symptoms, and obesity.

Furthermore, the association between ADHD symptoms and diet might also be influenced by ADHD medication (10, 55), because one of the short-term side effects of ADHD

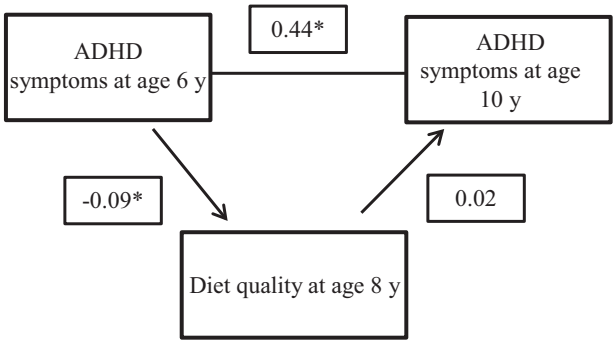

FIGURE 2 Directional associations between ADHD symptoms and diet quality in our study population. Values are pooled regression coefficients derived from linear regression analysis (all dependent scores were expressed in SD scores) and adjusted for energy intake, child ethnicity, sex, age, maternal BMI, child IQ score, BMI at ages 6 and 10 y (standardized), ADHD medication, maternal education, maternal smoking, maternal alcohol use, maternal psychiatric symptoms, net household income, screen time, and sports hours (model 3). Wald statistics: 7.23; $P = 0.01$. *$P < 0.05$. ADHD, attention-deficit/hyperactivity disorder; IQ, intelligence quotient.

medication could be a reduced appetite. Children who use medication may also eat less impulsively and may therefore consume a more healthful diet. For that reason, we examined whether our findings were influenced by medication use, but we did not find any differences in associations after excluding children who use medication. This finding is in keeping with other long-term studies of medication use and dietary habits.

Major strengths of our study include its population-based, longitudinal design, which enabled us to study the directionality of the associations. Furthermore, we had detailed information on repeatedly measured variables that we could consider as potential confounders or effect modifiers. Last, we used continuous guideline-based scores for both diet quality and ADHD symptoms, which provided us with more-sensitive information than dichotomous classifications and this complies with recent recommendations of experts. Despite these strengths, this study also has some limitations. We used parent-reported FFQ and CBCL questionnaires to assess dietary intake and ADHD symptoms. Therefore, information bias may have occurred. Some parents may have found it hard to assess their child's behavior, or they did not exactly know what their child consumed at school or during after-school care. Nevertheless, research has shown that the parent-reported CBCL is an accurate measurement tool for attention problems (38). Our study may also suffer from recall bias, because both the FFQ and CBCL ask parents about their child's dietary intakes and behaviors in the last 4 wk, which is less time-consuming but perhaps also less accurate than daily assessments. Furthermore, it could be suggested that both dietary patterns and ADHD symptoms might change over time, which was not taken into account in this study. In sum, we advise interpreting our main results with care. Future studies are needed to replicate our findings. Furthermore, a nonresponse analyses showed that children with missing dietary data more often had a non-Dutch ethnic background and their mothers had higher BMI values, were less educated, and had a lower net household income (42). This could have influenced our results because these variables might be associated with unhealthy dietary behaviors.

In conclusion, we observed that ADHD symptoms in childhood are associated with a subsequent poorer diet quality rather than the other way around. Future longitudinal studies are needed to replicate our analyses over longer time periods and should include different age groups. If our results are replicated, health care professionals working with children with ADHD should be aware of the potential risk for these children to develop unhealthy diets. These professionals should carefully monitor children's diets and provide parents with suggestions for healthy dietary choices.

Acknowledgments

The authors' responsibilities were as follows—AM, PWJ, and TV: designed the research and analyzed the data; PWJ and TV: were involved in the study design and data collection; AM and TV: wrote the manuscript and had primary responsibility for the final content; PWJ, ANN, AB, and CMR: provided input for the interpretation of the results and writing of the manuscript; and all authors: read and approved the final manuscript.

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